Failures of Utility Maximization

Behavioral Economics:
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Failures of Utility Maximization

- This presentation gives a (non-exhaustive) list of documented failures of utility maximization
- Will use this to motivate our study of bounded rationality (part 1) and reference dependence (part 3)
- See also Mike's class

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Failures of Utility Maximization

- Choice mistakes
- Stochastic choice
- Too much choice
- Status quo bias
- Endowment Effect
- Faming effects
- Asymmetric dominance/Compromise effects

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Choice Mistakes

- Claim: People often fail to choose the best alternative
- However, identifying 'choice mistakes' in the field can be challenging
- Hard to tell whether someone has chosen the best option
- Can be confounded with tastes...
  - a seemingly bad choice could in fact maximize preferences
  - observing violations of WARP can take a lot of data
- …or with lack of available information -
  - ex post bad choices could have been rational given ex-ante information
- Though see (for example) Abaluck and Gruber [2011]

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Choice Mistakes

- The lab offers the opportunity to observe choice while controlling preferences and information
- Makes 'mistakes' obvious and easy to observe
- Can measure how mistakes change with the environment

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Example 1: Caplin, Dean and Martin [2011]

- Subjects presented with a *large* number of alternatives
- *Small* cognitive cost to understanding the value of each alternative
  - E.g. Choosing which flight to take
- Generate an environment in which subjects systematically fail to choose the highest value alternative

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Leaving Money on the Table

Which of the following would you choose?

4	2
3	13
20	11
15	8
8	10

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Leaving Money on the Table

Which of the following would you choose?

4+6+10-11-23+9	2+3+6-11-14+9+10
3+9-17-99+102-6+15	6+18-19-55+70
20-27+7-19+2+3-5	11+2-5+7-8-9+10
15-5-5+6+16+17-20-9	8+9+10-11+8+2+6-32
8+8+9-13-9-6+7	10-9+17-23+10+2+15

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Example 1: Caplin, Dean and Martin [2011]

- Subjects choose between sums
- Dollar value of option is the value of the sum
- 'Full information' ranking obvious, but uncovering value takes effort
- 6 treatments
  - 2 x complexity (3 and 7 operations)
  - 3 x choice set size (10, 20 and 40 options)
- 22 Subjects, 657 choices
- No time limit

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Caplin, Dean and Martin [2011]

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Caplin, Dean and Martin [2011]

Failure rate

	Complexity	
Set size	3	7
10	7%	24%
20	22%	56%
40	29%	65%

Average Loss ($)

	Complexity	
Set size	3	7
10	0.41	1.69
20	1.10	4.00
40	2.30	7.12

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Example 2: Caplin and Dean [2014]

- Subjects presented with a *small* number of alternatives
- *Large* cognitive cost to understanding the value of each alternatives
  - e.g. choosing which of two available jobs to take
- Generate an environment in which subjects systematically fail to choose the highest value alternative

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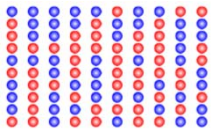
Choice Environment

- Subjects presented with 100 red and blue balls on a screen



- Must choose between `acts'
- Payout of act depends on number of red balls on the screen
- 'Full information' ranking obvious, but uncovering value takes effort
- No time limit

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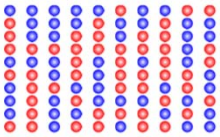
Choice Environment



Act	Payoff 49 Red Dots	Payoff 51 Red Dots
a	10	0
b	0	10

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Treatments

Decision Problem	U(a(49))	U(a(51))	U(b(49))	U(b(51))
1	2	0	0	2
2	10	0	0	10
3	20	0	0	20
4	30	0	0	30

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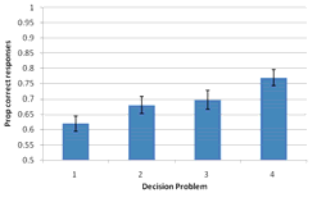
Aggregate Results



- Things to note (also true at the individual level)
  - Choice is stochastic (they make the correct choice some of the time)
  - Subjects do better than chance
  - Accuracy increases as incentives change
- Implies
  - Subject gather some information, but this information is imperfect
  - The amount of information gathered is endogenous to reward

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Random Choice

- If a decision maker is maximizing a stable utility function they should always choose the same thing from any choice set

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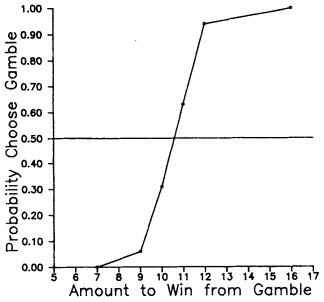
Nogee [1951]



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Random Choice

- As the quality of the lottery is increased, the probability of choosing it increases
- But it increases smoothly, not discretely as the utility maximization model would suggest
- Reminiscent of perceptual experiments
  - Which of two weights is heavier?

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Too Much Choice

- Example: Iyengar and Lepper [2000]
- Set up a display of jams in a local supermarket
- Two treatments:
  - Limited choice – 6 Jams
  - Extensive choice – 24 Jams
- Record what proportion of people stopped at each display
- And proportion of people bought jam conditional on stopping

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Iyengar and Lepper [2000]

- Slightly more people stopped to look at the display in the extensive choice treatment:
  - 60% Extensive choice treatment
  - 40% Limited choice treatment
- Far more people chose to buy jam, conditional on stopping, in the Limited choice treatment
  - 3% Extensive choice treatment
  - 31% Limited choice treatment

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Iyengar and Lepper [2000]

- Clear Violation of IIA
  - If 'don't buy' was chosen in the 24 jam set, should also have been chosen in the 6 jam setchoice
- Interpretation:
  - Large choice sets are 'demotivating'
  - People do not want the effort of making a decision
  - Therefore 'opt out' of making a choice altogether

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Other Examples

- Iyengar and Kamenica [2010]
  - Subjects offered choice between Lotteries
  - 120 subjects, 2 Conditions

Gamble #	If heads	If tails
Extensive condition		
1	$5.00	$5.00
2	$4.50	$7.75
3	$4.00	$8.25
4	$3.50	$8.75
5	$3.00	$9.50
6	$2.50	$10.00
7	$2.00	$10.50
8	$1.50	$11.25
9	$1.00	$11.75
10	$0.50	$12.50
11	$0.00	$13.50
Limited condition		
1	$5.00	$5.00
2	$3.50	$8.75
3	$0.00	$13.50

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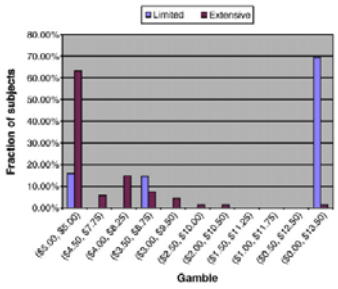
Iyengar and Kamenica 2010

- Results



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Iyengar and Kamenica 2010

- Risk Aversion or Simplicity?

Extensive condition						
Gamble #	If ⚀	If ⚁	If ⚂	If ⚃	If ⚄	If ⚅
1	$0.00	$0.00	$0.00	$10.00	$10.00	$10.00
2	$1.50	$9.25	$8.75	$7.00	$0.75	$1.25
3	$4.25	$5.50	$9.75	$8.50	$0.00	$0.75
4	$1.00	$2.00	$6.75	$7.50	$5.75	$4.75
5	$5.50	$1.00	$0.75	$6.50	$7.50	$6.75
6	$0.00	$0.00	$8.75	$2.75	$9.75	$8.00
7	$9.75	$3.00	$7.00	$6.50	$0.50	$1.50
8	$9.50	$1.50	$1.50	$2.50	$3.25	$10.00
9	$5.50	$8.50	$3.25	$0.00	$8.50	$2.50
10	$9.25	$7.75	$3.75	$2.00	$3.25	$2.00
11	$1.25	$4.50	$8.50	$8.75	$4.50	$0.75

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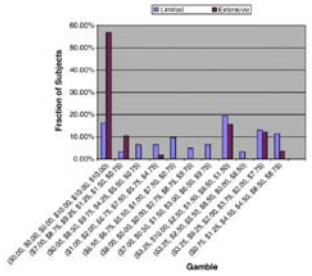
Iyengar and Kamenica 2010

- Results



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Too Much Choice

- Some debate over replicability
  - See Chernev, Alexander, Ulf Böckenholt, and Joseph Goodman. "Choice overload: A conceptual review and meta-analysis." *Journal of Consumer Psychology* 25.2 (2015): 333-358.

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Status Quo Bias

- Idea: more likely to choose an object because it is the 'status quo'
- What is a 'status quo'?
  - Something that you have chosen before
  - The way things currently are (status quo bias)
  - What happens if you do nothing (inertia/omission effect)

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Example: Madrian and Shea [2001]

- Observe behavior of workers in firms that offer 401k plans
  - Tax free pension savings
  - Generally considered to be a Good Thing
- Two types of plan:
  - Opt in: if no action is taken when joining firm , then do not take part in the plan
  - Opt out: if no action is taken when joining firm, then are automatically enrolled in scheme
- Compare uptake in different plans

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Madrian and Shea [2001]

- Many more employees take part in 401k plan under automatic enrollment
  - 86% Opt out
  - 37% Opt in
- Effect reduced with tenure
- Also, people are more likely to take up the default fund, and invest the default amount

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Madrian and Shea [2001]

- Interpretation: Violation of rationality, as choice over {enroll, not enroll} is dependent on initial position
- Status quo bias: stick with what you are initially given

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Endowment Effect

- Kahneman, Knetch and Thaler [1990]
  - 44 subjects
  - 22 Subjects given mugs
  - The other 22 subjects given nothing
  - Subjects who owned mugs asked to announce the price at which they would be prepared to sell mug
  - Subjects who did not own mug announced price at which they are prepared to buy mug
  - Experimenter figured out 'market price' at which supply of mugs equals demand
  - Trade occurred at that market price using Becker-DeGroot-Marschak procedure

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Endowment Effect

- Kahneman, Knetch and Thaler [1990]
- Prediction: As mugs are distributed randomly, we should expect half the mugs (11) to get traded
  - Consider the group of 'mug lovers' (i.e. those that have valuation above the median), of which there are 22
  - Half of these should have mugs, and half should not
  - The 11 mug haters that have mugs should trade with the 11 mug lovers that do not
- In 4 sessions, the number of trades was 4,1,2 and 2
- Median seller valued mug at $5.25
- Median buyer valued mug at $2.75
  - Willingness to pay/willingness to accept gap

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Endowment Effect

- Violation of rationality in the sense that value of object changes with ownership
  - E.g. If seller, choose {mug} from {mug, $4}
  - If buyer, choose {$4} from {mug, $4}
- Interpretation: Subjects place extra valuation on an object simply because they own it
- Related to 'Loss Aversion'
  - Losses loom larger than gains

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Framing Effects

- Framing effects refer to changes in the choices people make based on 'inconsequential' changes in the options
- We describe these as violations of rationality because we think really of these are the same object
  - Under one frame x is chosen from A
  - Under another y is chosen from A
- Depends on the definition of 'inconsequential'

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Example 1: Chetty et al. [2009] Salience and Taxation

- Prices are usually posted net of sales tax
- Price is added a register
- Adding a tag that includes the post tax price should be an 'inconsequential' change in the product
- Does it affect choice?

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Experiment 1

- Take 1 large supermarket
  - 30% of products have sales tax of 7.375% added at register
- Take three 'impulse purchase' product categories
  - Cosmetics, hair care accessories, deodorants
  - 750 products in total
- Add tags which displayed post tax price (as well as pre tax price)
  - Experiment lasted 3 weeks

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Experiment 1

- Empirical strategy: 'Difference in Difference'
  - Compare change in demand for treated goods to that of control groups
    - Control group 1: Different toiletries in same aisle of same store
    - Control group 2: All toiletries sold in two similar stores
  - Analysis performed at the 'category level'
    - 13 categories in treatment group
    - 95 in the control group

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Results

TABLE 3

Effect of Posting Tax-Inclusive Prices: DDD Analysis of Mean Quantity Sold

TREATMENT STORE

Period	Control Categories	Treated Categories	Difference
Baseline (2005:1-2006:6)	26.48 (0.22) [5,510]	25.17 (0.37) [754]	-1.31 (0.43) [6,264]
Experiment (2006:6-2006:10)	27.32 (0.87) [264]	23.87 (1.02) [76]	-3.45 (0.64) [324]
Difference over time	0.84 (0.75) [5,774]	-1.30 (0.92) [793]	DD_{TS} = -2.14 (0.68) [6,588]

CONTROL STORES

Period	Control Categories	Treated Categories	Difference
Baseline (2005:1-2006:6)	30.57 (0.24) [11,022]	27.94 (0.30) [1,508]	-2.63 (0.32) [12,529]
Experiment (2006:6-2006:10)	30.76 (0.72) [670]	28.19 (1.06) [76]	-2.57 (1.09) [646]
Difference over time	0.19 (0.64) [11,692]	0.25 (0.92) [1,586]	DD_{CS} = 0.06 (0.96) [13,175]
		DDD Estimate	-2.20 (0.59) [19,764]

Notes: Each cell shows mean quantity sold per category per week, for various subsets of the sample. Standard errors clustered by week in parentheses, number of observations in square brackets. Experimental period spans week 6 in 2006 to week 10 in 2006. Baseline period spans week 1 in 2005 to week 6 in 2006. Lower panel reflects averages across the two control stores.

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Bushong et al. [2010]

- Students presented with a series of snack foods,
- Selling price for each of these goods elicited using the Becker-Degroot-Marshak mechanism.
- Three conditions that varied in how the snack foods were described.
  1. Written description.
  2. Picture of snack food
  3. Open container of the snack food.
- Average bidding prices were not significantly different in the first two treatments, but were much higher in the third ($1.16 vs $0.71)

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Bertrand et al. [2010]

- Field experiment in South Africa.
- A subprime consumer lender randomized both the advertising content and interest rate in direct mail offers to 53,000 former clients.
  - a photograph on the letter,
  - reference to the interest rate as special or low,
  - suggestions for how to use the loan proceeds,
  - a large or small table of example loans,
  - inclusion of the interest rate as well as the monthly payments,
  - a comparison to a competitors' interest rate,
  - mention of speaking the local African language,
  - and mention of a promotional raffle prize for a cell phone.
- Significant effect on loan take up. Individually, the inclusion of a photo and a table of example loans where the important determinants.

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Huber, Payne and Puto [1982]

- Subjects were asked to choose between two types of beer.
  - $1.80 per six pack, and had a quality rating of 50.
  - $2.60 per 6 pack, but had a quality rating of 70.
- 43% of people chose the first option and 57% chose the second.
- Third option was added that was dominated by the first option
  - $1.80 and a quality rating of 40
- Increase the proportion of people choosing this option to 63%

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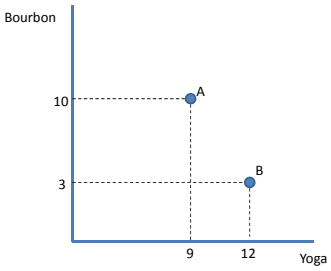
Asymmetric Dominance Effect



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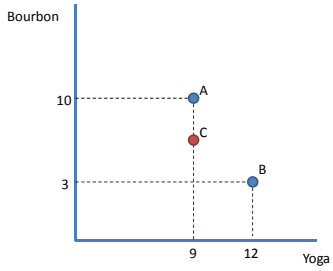
Asymmetric Dominance Effect



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Simonsen [1989]

- Subjects were offered a choice between two types of calculator battery.
  - Lifespan of 12 hrs and a 2% probability of corrosion.
  - Lifespan of 14 hrs and a 4% probability of corrosion.
- 43% chose the second battery.
  - Subjects were then told about a third option,
  - 16 hr life expectancy and a 6% probability of corrosion
- Under this condition, 60% of people chose the 14 hr/4% battery.

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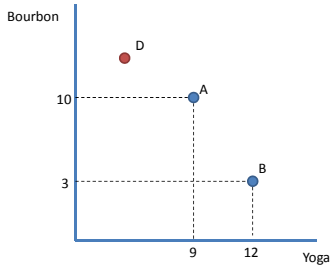
Context Effects



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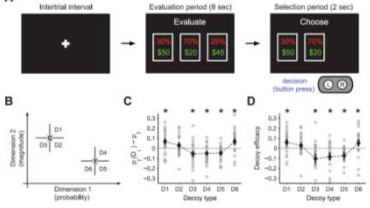
Soltani, De Martino and Camerer [2012]



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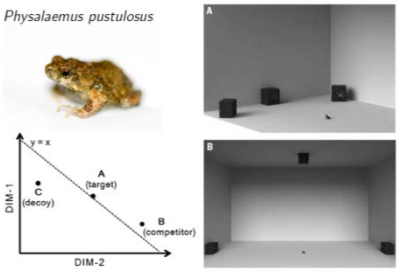
Context Effects



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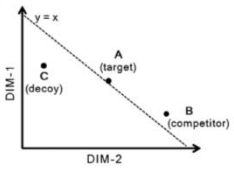
Context Effects



Menu	*A*	*B*	*C*
$\{A, B\}$	.37	.63	—
$\{B, C\}$	—	.69	.31
$\{A, C\}$	.84	—	.16
$\{A, B, C\}$	.55	.28	.17
$\{A, B, \not C\}$	.61	.39	—

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